

ABSTRACT OF THE DISCLOSURE

The present invention discloses a new type of biofuel cell, based on the microbial regeneration of the oxidant, ferric ions. The bio-fuel cell is based on the cathodic reduction of ferric to ferrous ions, coupled with the microbial regeneration of ferric ions by the oxidation of ferrous ions, with fuel (such as hydrogen) oxidation on the anode. The microbial regeneration of ferric ions is achieved by chemolithotrophic microorganisms such as *Acidithiobacillus ferrooxidans*. Electrical generation is coupled with the consumption of carbon dioxide from atmosphere and its transformation into microbial cells, which can be used as a single-cell protein.